

RESPONSE AND REQUEST FOR RECONSIDERATION

Response.

The amendments to the claims are believed to address the Examiner's objection to former claim 29 and the indefiniteness rejection as to claim 8.

Applicants express their appreciation for the indication from the Examiner that the previous 35 USC 103 rejections have been withdrawn.

The Examiner has rejected all claims as unpatentable over Davis (US 4,136,043) in view of either Le Suer '936 (U.S. 3,087,936) or Le Suer '677 (US 3,502,677). Davis discloses certain multifunctional dispersant compounds and the secondary Le Suer references disclose reaction products of dispersants with boron or phosphorus compounds. The Examiner had objected to the earlier-filed Declaration of Dr. Tipton as failing to provide a direct comparison against the closest prior art.

Applicants submit herewith Declarations from Dr. Suzanne Patterson and Dr. William Abraham, presenting data and analysis evidencing superiority over the teaching of Davis, US 4,136,043.

In Comparative Example 1 of Dr. Patterson's declaration, a formulation was prepared which contained, in pertinent part, a succinimide dispersant reacted to contain about 2.25% 3,5-dimethyl-1,3,4-thiadiazole (DMTD) on the basis of the neat dispersant. Separately, 0.85 percent by weight of an alkyl borate boron source (2-ethylhexyl borate) was present in the formulation, but not reacted with the dispersant. In Example 2, an inventive example, the same succinimide dispersant was reacted with both DMTD and boric acid (to contain 0.83% B on the neat dispersant), such that both the DMTD and boron were incorporated onto the dispersant. This Example 2 is similar to the example in paragraph 0038 of the Specification. The amount of boron in both Examples was the same within experimental error. All other constituents were identical except for the amount of base oil which was adjusted slightly to compensate for the amount of alkyl borate in comparative example 1 but missing from example 2.

The two formulations were subjected to a VSFT friction evaluation, which measures the anti-shudder durability of the fluid, as described in greater detail in Dr. Patterson's and Dr. Abraham's Declarations. Using two separate types of friction materials for the test, the lubricants formulated using the multifunctional dispersant of the present invention maintained a satisfactory performance for 37 and 29 hours of testing, that is, for 7 or 10 hours, respectively, longer than the comparative samples.

As explained in Dr. Abraham's Declaration, shudder is a friction-related phenomenon which results when the slope of coefficient of friction versus speed for a lubricant composition is significantly negative, in particular, less than about -0.006 units. The formulation of the present invention, in which the dispersant has both DMTD and boron chemically incorporated, exhibits significantly improved friction and anti-

shudder performance which is significantly and unexpectedly better than that of the reference formulation.

It is also submitted that the breadth of the claims is reasonably commensurate with the data presented. Claim 1 already specifies that the dispersant is, in particular, a succinimide dispersant. Component (b), the thiadiazole compound, is restricted to either unsubstituted 2,5-dimercapto-1,3,4-thiadiazole, or hydrocarbyl equivalents thereof that remain substantially insoluble in hydrocarbon oil, that is, those with relatively short hydrocarbyl substituents (e.g., less than 8 total carbon atoms, per claim 7). And the borating agent is limited to materials that appear to be reactively equivalent, as far as supplying boron to the dispersant is concerned. It is noted that new claim 30 further defines these materials as well as their amounts.

As the examiner has noted, the Davis reference discloses lubricant additives containing a product of an oil-soluble dispersant and at least one dimercapthiadiazole. The dispersants that may be used for the reaction with DMTD are "any" of the known types of dispersants. Among the innumerable possible dispersants are those made by post-treating a carboxylic or Mannich dispersant by any of a large number of reagents, only one type of which is generically described as boron compounds. It is not obvious to pick and choose a post-treated dispersant for reaction with DMTD, and then to further select boration from the multiple other types of post treatment. It is not obvious or expected that dispersants that are reacted with both DMTD and a boron compound, and in particular boric acid or boron trioxide (in the narrower claims) would exhibit the demonstrated improved frictional properties, compared with formulations in which a soluble boron compound is supplied as a separate component.

Conclusion.

For the foregoing reasons it is submitted that the present claims are unobvious and in condition for allowance. The foregoing remarks are believed to be a full and complete response to the outstanding office action. Therefore an early and favorable reconsideration is respectfully requested. If the Examiner believes that only minor issues remain to be resolved, a telephone call to the Undersigned is suggested.

The total number of claims remains 24. The number of independent claims is now 4. Please charge the fee for one excess independent claim, which is believed to be \$210.00 to deposit account 12-2275 (The Lubrizol Corporation). Any required fees or any deficiency or overpayment in fees should be applied to the same account.

Respectfully submitted,

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